



General

Guideline Title

ACR Appropriateness Criteria® radiologic management of mesenteric ischemia.

Bibliographic Source(s)

Fidelman N, Furaki BS, Ray CE Jr, Burke CT, Darcy MD, Kinney TB, Kostelic JK, Kouri BE, Lorenz JM, Mansour MA, Nair AV, Nemcek AA Jr, Owens CA, Rockey DC, Saad WEA, Vatakencherry G, Expert Panel on Interventional Radiology. ACR Appropriateness Criteria® radiologic management of mesenteric ischemia. [online publication]. Reston (VA): American College of Radiology (ACR); 2011. 5 p. [24 references]

Guideline Status

Note: This guideline has been updated. The National Guideline Clearinghouse (NGC) is working to update this summary.

Recommendations

Major Recommendations

Note: This guideline has been updated. The National Guideline Clearinghouse (NGC) is working to update this summary. The recommendations that follow are based on the previous version of the guideline.

ACR Appropriateness Criteria®

Clinical Condition: Mesenteric Ischemia

Variant 1: Elderly patient with recent onset abdominal pain, no peritoneal signs, known atrial fibrillation. CT scan shows filling defect in proximal superior mesenteric artery (SMA) consistent with thrombus.

Treatment/Procedure	Rating	Comments
Systemic anticoagulation	8	
Surgical embolectomy	5	Insufficient evidence. Therapy should be based on local expertise.
Angiography and transcatheter lytic therapy	5	Insufficient evidence. Therapy should be based on local expertise.
Angiography and suction embolectomy	5	Insufficient evidence. Therapy should be based on local expertise.
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate		

Supportive measures only (analgesics, nutritional support)	2	Rating	Comments
<u>Rating Scale:</u> 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 2: Elderly patient with history of abdominal pain after meals for the past few months and weight loss. CT scan of the abdomen shows aortic atherosclerotic disease and suggests SMA origin stenosis with occlusion of celiac origin and an occluded inferior mesenteric artery (IMA).

Treatment/Procedure	Rating	Comments
Angiography with possible angioplasty and stent placement	8	
Surgical bypass or endarterectomy	7	May be helpful if endovascular therapy is unsuccessful at addressing the symptoms.
Systemic anticoagulation	5	
Supportive measures only (analgesics, nutritional support)	3	
<u>Rating Scale:</u> 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate		

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 3: Middle-aged patient (40-60 years of age) with pain after meals and CT scan showing widely patent origins of SMA and IMA, with possible compression of the celiac origin by the median arcuate ligament.

Treatment/Procedure	Rating	Comments
Mesenteric angiography in lateral projection during both inspiration and expiration	8	CT angiography may be used as well.
Surgery with median arcuate ligament release, with or without bypass	7	
Supportive measures only (analgesics, nutritional support)	7	Median arcuate ligament syndrome is a diagnosis of exclusion. Therefore, a trial of supportive therapy is usually appropriate.
Systemic anticoagulation	2	
Angioplasty with stent placement	1	
<u>Rating Scale:</u> 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate		

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 4: Hospitalized patient with cardiac disease causing low cardiac output, on Lasix. Now with abdominal pain but without peritoneal signs. CT scan shows patent origins and proximal portions of celiac, SMA, and IMA, with some thickening of small bowel walls.

Treatment/Procedure	Rating	Comments
Angiography with infusion of vasodilator	8	
Systemic infusion of vasodilator (Prostaglandin E1)	6	
<u>Rating Scale:</u> 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate		

nutritional support)		
Treatment/Procedure	Rating	Comments
Surgery	2	
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate		

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 5: Previously healthy patient with worsening diffuse abdominal pain for 2 weeks. Contrast-enhanced CT shows occlusion of the superior mesenteric vein and its major tributaries. Small bowel appears normal.

Treatment/Procedure	Rating	Comments
Systemic anticoagulation	9	
Transhepatic SMV catheterization and thrombolytic infusion	7	May use either transhepatic or transjugular (TIPS) approach.
SMA angiography followed by thrombolytic infusion	5	
Surgery	3	
Supportive measures only (analgesics, nutritional support)	2	
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate		

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Summary of Literature Review

Diagnosis of Mesenteric Occlusive Disease

Detection of proximal mesenteric arterial occlusive disease is possible with computed tomography (CT), magnetic resonance angiography (MRA), and ultrasound (US). Ostial lesions are reliably evaluated with all three modalities. Both US and MRA have been directly compared with angiography. Multidetector CT scanners, particularly with sagittal reformatting, are capable of demonstrating the proximal mesenteric vessels very well. CT relies on administration of iodinated contrast but does not entail the risks of angiography.

In a patient with renal insufficiency or a history of severe reaction to iodinated contrast, noncontrast MRA or US of the mesenteric vessels origins is preferred over CT. Results will vary considerably with operator expertise, patient body habitus, and presence of bowel gas, but accuracy in detecting ostial abnormality has been reported to be greater than 90%. The more peripheral mesenteric vessels are not as well demonstrated with US or CT scanning, and angiography has remained the best method to evaluate these vessels. Therefore, if clinical suspicion of mesenteric ischemia is high, a negative CT or US exam should not preclude selective mesenteric angiography, particularly if distal disease is a consideration.

Acute Nonocclusive Mesenteric Ischemia

In a patient with signs and symptoms of acute mesenteric ischemia, narrowing of peripheral mesenteric vessels or a pattern of alternating dilatation and narrowing suggests nonocclusive mesenteric ischemia. This diagnosis is best made with conventional angiography, which would also enable initiation of catheter-directed vasodilator infusion therapy. Angiography can provide superior anatomic detail not available from CT or US. However, recent data suggest that if a patient is not clinically stable enough to undergo angiography, multidetector contrast-enhanced CT may provide adequate information to make a diagnosis of nonocclusive mesenteric ischemia. Vasoconstriction may lead to bowel ischemia and necrosis with a mortality rate that has been reported to be 70%. Early diagnosis and treatment are critically important in acute mesenteric ischemia to avoid bowel infarction. Typically therapy consists of intra-arterial administration of vasodilators, such as nitroglycerin, papaverine, or glucagon. Administration of high-dose intravenous prostaglandin E1 may be equally effective. While an angiogram is the preferable means of diagnosis that also allows for an intra-arterial catheter to be left in-situ for pharmacologic therapy, patients who are critically ill may benefit from rapid diagnosis afforded by the multidetector CT with subsequent institution of systemic intravenous pharmacotherapy.

Acute Occlusive Mesenteric Ischemia

Surgery has been the standard of care for acute occlusive mesenteric ischemia over the past decades. Recently, several endovascular techniques

have been described in the literature, including aspiration embolectomy and thrombolysis for embolic occlusion of the superior mesenteric artery (SMA), as well as stenting of the underlying atherosclerotic acute occlusions. Literature supporting the use of aspiration embolectomy is limited to case reports and small series. Thrombolysis for treatment of mesenteric thrombosis or embolus has been reported as a sole intervention or as an adjunct to aspiration embolectomy. While it is technically feasible and in many reported cases successful, a recent review article identified published reports of thrombolytic therapy covering only a total of 43 patients. Thrombolysis could be applied in only a minority of patients presenting with acute mesenteric ischemia. Thrombolysis is contraindicated in bowel infarction, and any indication of bowel infarction (peritoneal symptoms, pneumoperitoneum, or intramural air on CT) is an indication for urgent surgery rather than thrombolysis. The inability to confidently exclude bowel infarction in many patients with mesenteric ischemia has limited widespread use of thrombolysis. Due to the presence of vasospasm associated with occlusive mesenteric ischemia, catheter-directed vasodilator infusion may also be of benefit in some patients with occlusive mesenteric ischemia, especially prior to more definitive therapy. Treatment of underlying stenotic or occlusive lesions using percutaneous transarterial angioplasty or stenting (PTA/S) can be achieved at the same setting as diagnosis, sometimes after removal of a thrombotic clot by aspiration or thrombolysis. Data from the United States Nationwide Inpatient Sample suggests that in the setting of acute mesenteric ischemia, PTA/S carries a lower risk of overall morbidity and in-hospital mortality than bypass surgery. However, evidence for the use of endovascular therapy in the setting of acute mesenteric ischemia remains limited.

Chronic Mesenteric Ischemia

Chronic mesenteric ischemia most commonly occurs due to atherosclerotic occlusive disease of the mesenteric arteries (celiac axis, SMA, inferior mesenteric artery). Signs and symptoms of chronic mesenteric ischemia include weight loss, sitophobia (food fear), and abdominal pain after eating. Given the relatively rich collateral supply to bowel, signs and symptoms of ischemia typically occur when at least two arteries (and often all three) are affected. Endovascular therapy, particularly angioplasty and stenting, has supplanted open surgical repair as the preferred therapy for mesenteric origin stenoses in patients without bowel infarction. Mortality and morbidity are believed to be lower for endovascular interventions compared to open repair; however, more patients develop recurrent symptoms and require reintervention following endovascular treatment than after open repair.

Venous Mesenteric Ischemia

Mesenteric venous thrombosis (MVT) accounts for 5% to 15% of all cases of mesenteric ischemia. Patients may have evocative signs, such as abdominal pain, nausea, or vomiting. However, clinical diagnosis is often difficult because abdominal symptoms are nonspecific. Diagnosis can be established by noninvasive means, such as multidetector CT and MR venography. The mainstay of therapy is systemic anticoagulation with heparin or warfarin. Generally, patients maintained on systemic anticoagulation have higher chances of recanalization of the occluded veins and lower odds of recurrence. Long-term systemic anticoagulation is usually required. Bleeding in the necrotic bowel may result, but this possibility should not delay systemic anticoagulation, and bleeding has to be treated if it occurs. Thrombolysis with or without mechanical thrombectomy may re-establish splanchnic venous flow and prevent bowel infarction in the setting of an acute or a subacute venous thrombosis. The rate of blood flow restoration by thrombolytic administration into the SMA appears to be lower than that of direct thrombolytic administration into the splanchnic veins.

Median Arcuate Ligament Syndrome

The median arcuate ligament is a fibrous band connecting the right and left hemidiaphragms and is found in up to 20% of the population. The incidence, and even existence, of abdominal symptoms due to compression of the celiac artery by the median arcuate ligament is debatable. The compression has been postulated to limit blood flow to bowel with resulting ischemic symptoms or to irritate the celiac ganglion, which results in abdominal pain. Compression of the celiac artery may be a normal finding in asymptomatic patients and is well characterized.

Patients with imaging evidence of celiac axis compression have been treated with best results in patients who had both celiac decompression (surgical division of the ligament) and some form of celiac artery revascularization. Predictors for successful outcome in one study were "postprandial pain pattern (81% cured), age between 40 and 60 (77% cured), and weight loss of 20 pounds or more (67% cured)". There is no evidence supporting the use of angioplasty and stenting in this entity, and endovascular dilation may be contraindicated unless ligament release has been performed first.

Summary

- Noninvasive tests such as CTA, MRA, or US should be the initial choice for evaluating chronic mesenteric ischemia. These modalities can reliably diagnose proximal occlusive disease. Conventional angiography is reserved for diagnosis of distal disease or is performed concurrently with endovascular treatment.
- Angioplasty and stent insertion have shown promising results in treating chronic mesenteric ischemia due to proximal mesenteric occlusive disease and are considerably less invasive than open surgical bypass.

- Because rapid diagnosis and treatment are mandatory in acute mesenteric ischemia, if clinical suspicion is high, conventional angiography is the best overall modality for diagnosis, particularly if it can be obtained with minimal delay.
- Thrombolysis for acute occlusive mesenteric ischemia is predicated on an ability to confidently exclude bowel infarction.
- Patients with acute nonocclusive mesenteric ischemia may benefit from catheter-directed intra-arterial vasodilator infusion. Some patients with acute occlusive mesenteric ischemia may also benefit from vasodilator infusion prior to more definitive therapy.
- Patients with symptomatic mesenteric vein thrombosis should be treated with systemic anticoagulation. Thrombolytic therapy administered via a transhepatically or transjugularly placed catheter may re-establish flow and prevent bowel infarction in patients with acute or subacute mesenteric vein thromboses.

Abbreviations

- CT, computed tomography
- IMA, inferior mesenteric artery
- SMA, superior mesenteric artery
- SMV, superior mesenteric vein
- TIPS, transjugular intrahepatic portosystemic shunt

Clinical Algorithm(s)

Algorithms were not developed from criteria guidelines.

Scope

Disease/Condition(s)

- Acute nonocclusive mesenteric ischemia
- Acute occlusive mesenteric ischemia
- Chronic mesenteric ischemia
- Venous mesenteric ischemia
- Median arcuate ligament syndrome

Guideline Category

Diagnosis

Evaluation

Management

Treatment

Clinical Specialty

Emergency Medicine

Gastroenterology

Geriatrics

Internal Medicine

Radiology

Surgery

Intended Users

Health Plans

Hospitals

Managed Care Organizations

Physicians

Utilization Management

Guideline Objective(s)

To evaluate the appropriateness of radiologic examinations and therapeutic procedures for patients with mesenteric ischemia

Target Population

Patients with mesenteric ischemia

Interventions and Practices Considered

Diagnosis/Evaluation

1. Computed tomography angiography (CTA)
2. Magnetic resonance angiography (MRA)
3. Ultrasound (US)
4. Mesenteric angiography in select patients

Management/Treatment

1. Systemic anticoagulation
2. Surgery
 - Embolectomy
 - Bypass or endarterectomy
 - With median arcuate ligament release, with or without bypass
3. Angiography
 - With transcatheter lytic therapy
 - With suction embolectomy
 - With possible angioplasty and stent placement
 - With infusion of vasodilator
4. Mesenteric angiography in lateral projection during both inspiration and expiration
5. Angioplasty with stent placement
6. Systemic infusion of vasodilator (Prostaglandin E1)
7. Transhepatic superior mesenteric vein (SMV) catheterization and thrombolytic infusion
8. Superior mesenteric artery (SMA) angiography followed by thrombolytic infusion
9. Supportive measures only (analgesics, nutritional support)

Major Outcomes Considered

Utility of radiologic examinations in differential diagnosis
Effectiveness of treatment

Methodology

Methods Used to Collect/Select the Evidence

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

Literature Search Procedure

The Medline literature search is based on keywords provided by the topic author. The two general classes of keywords are those related to the condition (e.g., ankle pain, fever) and those that describe the diagnostic or therapeutic intervention of interest (e.g., mammography, MRI).

The search terms and parameters are manipulated to produce the most relevant, current evidence to address the American College of Radiology Appropriateness Criteria (ACR AC) topic being reviewed or developed. Combining the clinical conditions and diagnostic modalities or therapeutic procedures narrows the search to be relevant to the topic. Exploding the term "diagnostic imaging" captures relevant results for diagnostic topics.

The following criteria/limits are used in the searches.

1. Articles that have abstracts available and are concerned with humans.
2. Restrict the search to the year prior to the last topic update or in some cases the author of the topic may specify which year range to use in the search. For new topics, the year range is restricted to the last 5 years unless the topic author provides other instructions.
3. May restrict the search to Adults only or Pediatrics only.
4. Articles consisting of only summaries or case reports are often excluded from final results.

The search strategy may be revised to improve the output as needed.

Number of Source Documents

The total number of source documents identified as the result of the literature search is not known.

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Strength of Evidence Key

Category 1 - The conclusions of the study are valid and strongly supported by study design, analysis and results.

Category 2 - The conclusions of the study are likely valid, but study design does not permit certainty.

Category 3 - The conclusions of the study may be valid but the evidence supporting the conclusions is inconclusive or equivocal.

Category 4 - The conclusions of the study may not be valid because the evidence may not be reliable given the study design or analysis.

Methods Used to Analyze the Evidence

Systematic Review with Evidence Tables

Description of the Methods Used to Analyze the Evidence

The topic author drafts or revises the narrative text summarizing the evidence found in the literature. American College of Radiology (ACR) staff draft an evidence table based on the analysis of the selected literature. These tables rate the strength of the evidence for all articles included in the narrative text.

The expert panel reviews the narrative text, evidence table, and the supporting literature for each of the topic-variant combinations and assigns an appropriateness rating for each procedure listed in the table. Each individual panel member forms his/her own opinion based on his/her interpretation of the available evidence.

More information about the evidence table development process can be found in the ACR Appropriateness Criteria® Evidence Table Development document (see "Availability of Companion Documents" field).

Methods Used to Formulate the Recommendations

Expert Consensus (Delphi)

Description of Methods Used to Formulate the Recommendations

Modified Delphi Technique

The appropriateness ratings for each of the procedures included in the Appropriateness Criteria topics are determined using a modified Delphi methodology. A series of surveys are conducted to elicit each panelist's expert interpretation of the evidence, based on the available data, regarding the appropriateness of an imaging or therapeutic procedure for a specific clinical scenario. American College of Radiology (ACR) staff distributes surveys to the panelists along with the evidence table and narrative. Each panelist interprets the available evidence and rates each procedure. The surveys are completed by panelists without consulting other panelists. The ratings are a scale between 1 and 9, which is further divided into three categories: 1, 2, or 3 is defined as "usually not appropriate"; 4, 5, or 6 is defined as "may be appropriate"; and 7, 8, or 9 is defined as "usually appropriate." Each panel member assigns one rating for each procedure per survey round. The surveys are collected and the results are tabulated, de-identified and redistributed after each round. A maximum of three rounds are conducted. The modified Delphi technique enables each panelist to express individual interpretations of the evidence and his or her expert opinion without excessive bias from fellow panelists in a simple, standardized and economical process.

Consensus among the panel members must be achieved to determine the final rating for each procedure. Consensus is defined as eighty percent (80%) agreement within a rating category. The final rating is determined by the median of all the ratings once consensus has been reached. Up to three rating rounds are conducted to achieve consensus.

If consensus is not reached, the panel is convened by conference call. The strengths and weaknesses of each imaging procedure that has not reached consensus are discussed and a final rating is proposed. If the panelists on the call agree, the rating is accepted as the panel's consensus. The document is circulated to all the panelists to make the final determination. If consensus cannot be reached on the call or when the document is circulated, "No consensus" appears in the rating column and the reasons for this decision are added to the comment sections.

Rating Scheme for the Strength of the Recommendations

Not applicable

Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

Method of Guideline Validation

Internal Peer Review

Description of Method of Guideline Validation

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The recommendations are based on analysis of the current literature and expert panel consensus.

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

Selection of appropriate radiologic imaging and treatment procedures for patients with mesenteric ischemia
Early diagnosis and treatment of acute mesenteric ischemia may help prevent bowel infarction.

Potential Harms

- Mortality and morbidity are believed to be lower for endovascular interventions compared to open repair; however, more patients develop recurrent symptoms and require reintervention following endovascular treatment than after open repair.
- Data from the United States Nationwide Inpatient Sample suggests that in the setting of acute mesenteric ischemia, percutaneous transarterial angioplasty or stenting carries a lower risk of overall morbidity and in-hospital mortality than bypass surgery.
- Bleeding in the necrotic bowel may result from systemic anticoagulation.

Contraindications

Contraindications

- Thrombolysis is contraindicated in bowel infarction, and any indication of bowel infarction (peritoneal symptoms, pneumoperitoneum, or intramural air on computed tomography) is an indication for urgent surgery rather than thrombolysis.
- There is no evidence supporting the use of angioplasty and stenting for median arcuate ligament syndrome, and endovascular dilation may be contraindicated unless ligament release has been performed first.

Qualifying Statements

Qualifying Statements

The American College of Radiology (ACR) Committee on Appropriateness Criteria and its expert panels have developed criteria for determining appropriate imaging examinations for diagnosis and treatment of specified medical condition(s). These criteria are intended to guide radiologists, radiation oncologists, and referring physicians in making decisions regarding radiologic imaging and treatment. Generally, the complexity and severity of a patient's clinical condition should dictate the selection of appropriate imaging procedures or treatments. Only those examinations generally used for evaluation of the patient's condition are ranked. Other imaging studies necessary to evaluate other co-existent diseases or other medical consequences of this condition are not considered in this document. The availability of equipment or personnel may influence the selection of appropriate imaging procedures or treatments. Imaging techniques classified as investigational by the U.S. Food and Drug Administration (FDA) have not been considered in developing these criteria; however, study of new equipment and applications should be encouraged. The ultimate decision regarding the appropriateness of any specific radiologic examination or treatment must be made by the referring physician and radiologist in light of all the circumstances presented in an individual examination.

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Getting Better

Living with Illness

IOM Domain

Effectiveness

Identifying Information and Availability

Bibliographic Source(s)

Fidelman N, Funaki BS, Ray CE Jr, Burke CT, Darcy MD, Kinney TB, Kostelic JK, Kouri BE, Lorenz JM, Mansour MA, Nair AV, Nemcek AA Jr, Owens CA, Rockey DC, Saad WEA, Vatakencherry G, Expert Panel on Interventional Radiology. ACR Appropriateness Criteria® radiologic management of mesenteric ischemia. [online publication]. Reston (VA): American College of Radiology (ACR); 2011. 5 p. [24 references]

Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

2008 (revised 2011)

Guideline Developer(s)

American College of Radiology - Medical Specialty Society

Source(s) of Funding

The American College of Radiology (ACR) provided the funding and the resources for these ACR Appropriateness Criteria®.

Guideline Committee

Committee on Appropriateness Criteria, Expert Panel on Interventional Radiology

Composition of Group That Authored the Guideline

Panel Members: Nicholas Fidelman, MD; Brian S. Funaki, MD; Charles E. Ray, Jr, MD; Charles T. Burke, MD; Michael D. Darcy, MD; Thomas B. Kinney, MD; Jon K. Kostelic, MD; Brian E. Kouri, MD; Jonathan M. Lorenz, MD; M. Ashraf Mansour, MD; Ajit V. Nair, MD; Albert A. Nemcek Jr, MD; Charles A. Owens, MD; Don C. Rockey, MD; Wael E. A. Saad, MB, BCh; George Vatakencherry, MD

Financial Disclosures/Conflicts of Interest

Not stated

Guideline Status

Note: This guideline has been updated. The National Guideline Clearinghouse (NGC) is working to update this summary.

Guideline Availability

Electronic copies of the updated guideline: Available from the [American College of Radiology \(ACR\) Web site](#) .

Print copies: Available from the American College of Radiology, 1891 Preston White Drive, Reston, VA 20191. Telephone: (703) 648-8900.

Availability of Companion Documents

The following are available:

- ACR Appropriateness Criteria®. Overview. Reston (VA): American College of Radiology; 2 p. Electronic copies: Available in Portable Document Format (PDF) from the [American College of Radiology \(ACR\) Web site](#) .
- ACR Appropriateness Criteria®. Literature search process. Reston (VA): American College of Radiology; 1 p. Electronic copies: Available in Portable Document Format (PDF) from the [ACR Web site](#) .
- ACR Appropriateness Criteria®. Evidence table development – diagnostic studies. Reston (VA): American College of Radiology; 2013 Nov. 3 p. Electronic copies: Available in PDF from the [ACR Web site](#) .
- ACR Appropriateness Criteria®. Evidence table development – therapeutic studies. Reston (VA): American College of Radiology; 2013 Nov. 4 p. Electronic copies: Available in PDF from the [ACR Web site](#) .
- ACR Appropriateness Criteria® radiologic management of mesenteric ischemia. Evidence table. Reston (VA): American College of Radiology; 2011. 7 p. Electronic copies: Available from the [ACR Web site](#) .

Patient Resources

None available

NGC Status

This NGC summary was completed by ECRI Institute on June 24, 2009. This NGC summary was updated by ECRI Institute on July 6, 2011. This summary was updated by ECRI Institute on March 10, 2014 following the U.S. Food and Drug Administration advisory on Low Molecular Weight Heparins.

Copyright Statement

Instructions for downloading, use, and reproduction of the American College of Radiology (ACR) Appropriateness Criteria® may be found on the [ACR Web site](#) .

Disclaimer

NGC Disclaimer

The National Guideline Clearinghouse® (NGC) does not develop, produce, approve, or endorse the guidelines represented on this site.

All guidelines summarized by NGC and hosted on our site are produced under the auspices of medical specialty societies, relevant professional associations, public or private organizations, other government agencies, health care organizations or plans, and similar entities.

Guidelines represented on the NGC Web site are submitted by guideline developers, and are screened solely to determine that they meet the NGC Inclusion Criteria which may be found at <http://www.guideline.gov/about/inclusion-criteria.aspx>.

NGC, AHRQ, and its contractor ECRI Institute make no warranties concerning the content or clinical efficacy or effectiveness of the clinical practice guidelines and related materials represented on this site. Moreover, the views and opinions of developers or authors of guidelines represented on this site do not necessarily state or reflect those of NGC, AHRQ, or its contractor ECRI Institute, and inclusion or hosting of guidelines in NGC may not be used for advertising or commercial endorsement purposes.

Readers with questions regarding guideline content are directed to contact the guideline developer.